

## ABSTRACT

A method and apparatus for processing a waste product and producing a synthesis gas is provided. The system includes a sealed, heated rotatable drum for preheating and preparing the waste material suitable for a plasma reactor, and processing the material in the reactor. The synthesis gas created by the reactor is used to preheat the waste material by circulating the hot synthesis gas around the drum. In an alternative embodiment, the hot synthesis gas flows through the drum to preheat the waste material and to clean the synthesis gas. Different methods of cooling and cleaning the synthesis gas are used. The system may comprise two plasma reactors in combination with a rotating desorber drum.